TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING & CIVIL ENGINEERING
UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN CIVIL ENGINEERING
ECE 2317: THEORY OF SRTUCTURES IV
SPECIAL SUPPLEMENTARY EXAMINATION
SERIES: SEPT. 2017
TIME: 2 HOURS

Instructions to Candidates
You should have the following for this examination
    -*Answer Booklet, examination pass and student ID*
This paper consists of five questions.
Answer question ONE (COMPULSORY) and any other TWO questions
Do not write on the question paper.

QUESTION ONE (COMPULSORY)
  i)   Figure Q.1 (a) is a bridge truss loaded at point C and D and resting freely at the two
       supports. Using Castagliano's 1st theorem and taking the modulus of elasticity as
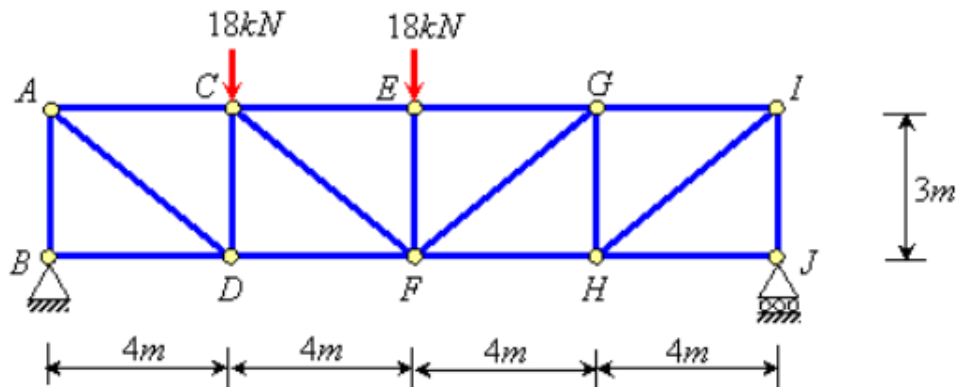   230KN/mm^2.

Figure Q.1 (a)

(20 marks)

  ii) State Castagliano's 2nd theorem and show that the deflection of a frame using this principle
       is given by $[-\lambda = \frac{\delta U}{\delta R}]$

(10 marks)

ATTEMPT ANY TWO QUESTIONS
QUESTION TWO

i) A braced span AB shown in figure Q.2(a) supports a vertical load of 100KN. find the maximum deflection in span AB and the deflection at C in terms of EI using **moment area method.**
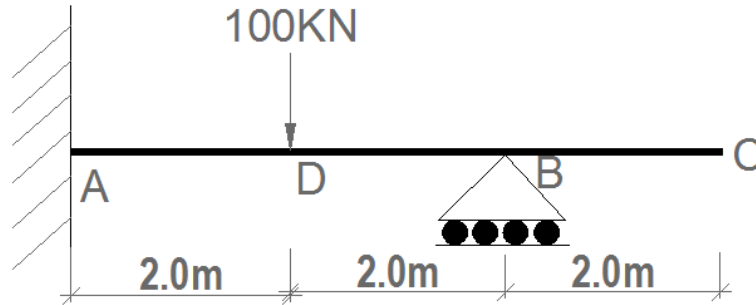

Figure Q.2(a)

(17 marks)

ii) State Castagliano's 1st theorem and show the equation associated with it.

(3 marks)

QUESTION THREE

Figure Q.3 shows a continuous beam loaded with a *udl* along the whole span. Using conjugate beam method, determine deflection at point *d* using **conjugate beam method.**
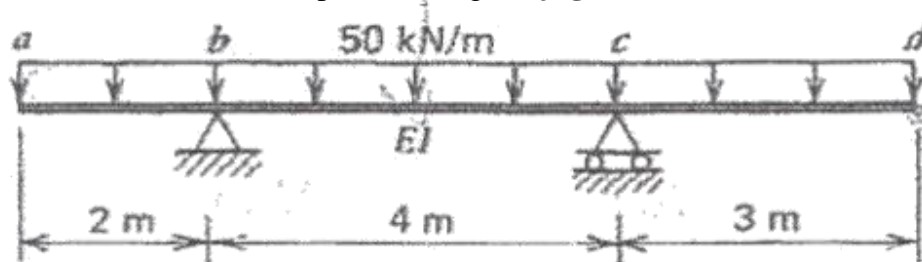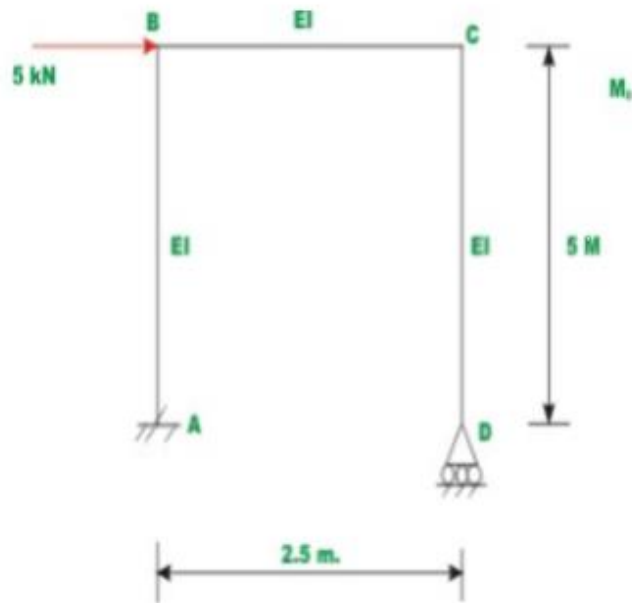

Figure Q.3

(18 marks)

QUESTION FOUR

i) State the principle of virtual work and explain how it's applied in the analysis of trusses.

(3 marks)

ii) Find the horizontal displacement at joint B of the frame ABCD as shown in Figure Q.4 (b) by virtual work method. Assume EI to be constant for all members.

(17 marks)

Figure Q.4 (b)

QUESTION FIVE

Determine the value of reaction at support D for the beam shown in figure Q.5 using the method of least work.
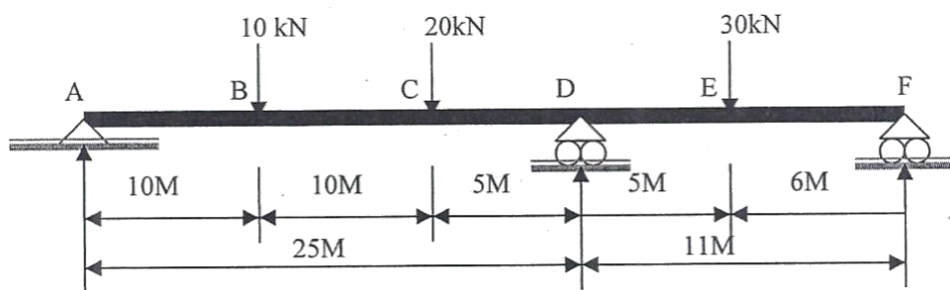

Figure Q.5

(20 marks)